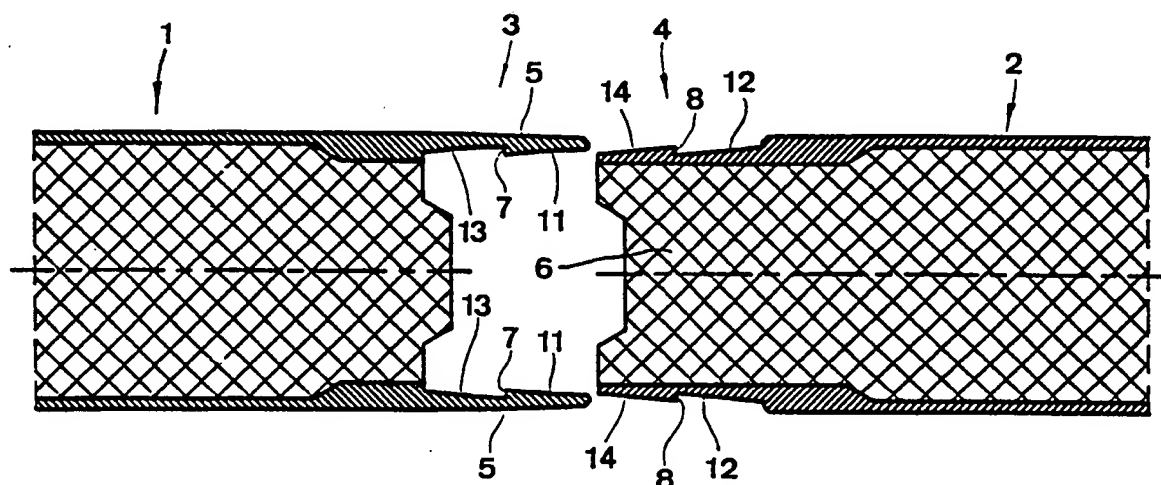


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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁵ : E04C 2/26 // E04B 1/61	A1	(11) International Publication Number: WO 94/04773 (43) International Publication Date: 3 March 1994 (03.03.94)
(21) International Application Number: PCT/SE93/00695 (22) International Filing Date: 23 August 1993 (23.08.93) (30) Priority data: 9202415-7 24 August 1992 (24.08.92) SE (71)(72) Applicants and Inventors: ERICSSON, Karl-Gustav [SE/SE]; Södermalmsgatan 42, S-852 35 Sundsvall (SE). LAURÉN, Christer [SE/SE]; Hovtångsvägen 3, S-725 96 Västerås (SE). (72) Inventor; and (75) Inventor/Applicant (for US only) : LUNDBERG, Lars [SE/SE]; Bössebergsvägen 12, S-722 33 Västerås (SE).		(74) Agents: BJERKÉNS PATENTBYRÅ AB et al.; Box 304, S-801 04 Gävle (SE). (81) Designated States: AT, AU, BB, BG, BR, BY, CA, CH, CZ, DE, DE (Utility model), DK, DK (Utility model), ES, FI, GB, HU, JP, KP, KR, KZ, LK, LU, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SK, UA, US, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>In English translation (filed in Swedish).</i>

(54) Title: A DEVICE IN A JOINT BETWEEN TWO ELEMENTS**(57) Abstract**

A device in a joint between two elements (1, 2), which for joining thereof comprises female and male edge portions (3, 4), respectively, a female edge portion of a first of the elements having space tongues (5) adapted to receive an extension (6) forming the male edge portion (4) of a second of the elements therebetween. The tongues (5) and the extension (6) have mutually co-operating engagement means (7, 8) adapted to automatically engage with each other on bringing the elements together so as to counteract a separation of the elements thereafter.

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"A device in a joint between two elements"

10 FIELD OF THE INVENTION AND PRIOR ART

This invention relates to a device in a joint between two elements, which for joining thereof comprises female and male edge portions, respectively, the female edge portion of a first of the elements having
15 spaced tongues adapted to receive an extension forming the male edge portion of a second of the elements therebetween.

Such a device is described in the Swedish patent 8503500-4 (453 763). Although this known device has turned out to be very advanta-
20 geous it has nevertheless some minor drawbacks. According to the patent publication the use of a glue or the like is a condition for joining the two elements. Such a glue is applied on the inner sides of the tongues and/or on the outer sides of the extension. The elements have to be held still with a high accuracy until the glue has cured, since the
25 relative position otherwise may be unsatisfactory. A drawback of such a gluing technique is also that it gets comparatively time consuming to build more extensive structures. The building work has then of course to take place in stages, so that the glue joints have time to cure in a first stage before the following stages are carried out.

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The prior art leaves a great deal to be desired with respect to the strength, stability and tightness of the joints.

SUMMARY OF THE INVENTION

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The object of the present invention is to develop a device defined in the introduction so that the drawbacks mentioned above are reduced.

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This is in accordance with the invention obtained by the fact that the tongues and the extension have mutually co-operating engagement means adapted to automatically engage with each other on bringing
5 the elements together so as to counteract a separation of the elements thereafter.

Accordingly, positive mechanical engagement between the elements is thereby achieved already when they are brought together and without
10 any dependency of the unity on curing to a certain minimum extent of any adhesive peradventure used. Accordingly, this means that the solution according to the invention makes it possible to rapidly build comparatively complicated structures without any need of waiting for the curing of the adhesive. It is true that a more improved strength is
15 achieved when the adhesive has cured completely, when an adhesive is used for an additional strength in a joint, but the co-operating engagement means of the elements should have a sufficiently inter-connecting and stabilizing function so as to manage all load situations normally existing during the building phase. The solution according to
20 the invention makes it therefore possible to rapidly and efficiently carry out a structure made of the elements in question wherever this is required without the need to be dependent on fixtures, clamping means, support means etc so as to provisionally stabilize the structure while erecting it and until the adhesive used has cured.

25 Important embodiments of the invention are defined in the dependent claims. According to certain aspects of these embodiments a particularly efficient hooking of the elements together and tightness in the joint obtained are achieved.

30 BRIEF DESCRIPTION OF THE DRAWINGS

With reference to the appended drawings, below follows a specific description of a preferred embodiment of the invention cited as an
35 example.

In the drawings:

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Fig 1 is a schematic cross section illustrating the construction of the edge portions of two elements engagable with each other,

5 Fig 2 is a view similar to Fig 1 but illustrating an adhesive applied on one of the elements,

Figs 3 and 4 are views similar to Fig 2 illustrating different situations when the elements are brought together, and

10

Fig 5 is a cross section view illustrating the elements in assembled state.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

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The invention relates to a device in a joint between two elements generally indicated by 1 and 2, respectively. These elements have female and male edge portions 3, 4, respectively, for joining thereof. A female edge portion 3 of the element 1 has spaced tongues 5 adapted to receive an extension 6 forming the male edge portion 4 of the element 2 therebetween.

20

The tongues 5 and the extension 6 have mutually co-operating engagement means 7 and 8, respectively, adapted to automatically engage with each other on bringing the elements together so as to counteract the separation of the elements thereafter.

25

It is preferred that the elements 1 and 2 have the character of sheets. The elements or the sheets 1, 2 may be used for forming all types of structures, such as vessels, containers, walls, houses, caravans, caravanets, floor, roof and beam constructions etc. It is understood that each of the elements 1 and 2 schematically illustrated in the drawings is intended to have suitable shapes for joining with respect to further elements along other edge portions not shown.

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Each of the elements 1, 2 comprises at least an intermediate layer 9 and two comparatively rigid surface layers 10. The surface layers 10

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are normally more rigid or stiffer than the intermediate layer 9. The surface layers may for example consist of a comparatively rigid plastic. The intermediate layer may very well consist of a foamed plastic or otherwise a comparatively light material, which carries out a spacing function between the rigid surface layers. Thus, a sandwich construction is obtained therethrough.

It is preferred that the intermediate layer has a high heat insulating capacity, which is obtained in particular when using foamed plastic as material for the intermediate layer 9.

The rigid surface layers 10 are closely bound to the intermediate layer 9. The manufacture method thereof may vary. The surface layer 10 and the intermediate layer 9 may for example be separately produced and then assembled by gluing. Another method is to prefabricate the surface layers 10, place them in a mould or another suitable holding device and then inject the material for the intermediate layer 9 between these surface layers.

The tongues 5 of the element 1 are formed by the rigid surface layers 10.

The extension 6 is formed on one hand by the intermediate layer 9 and on the other by parts of the surface layers 10 located on both sides thereof. The extension 6 will usually have a smaller thickness than the element 2 beside the extension, although the thickness difference as in the case shown may be comparatively small.

The engagement means 7, 8 have the character of inner and outer hook formations on the tongues 5 and the extension 6, respectively. These hook formations 7, 8 are formed by step-like steps or shoulders able to co-operate so that a snap-locking function is established on bringing the elements together. This means that the elements may be brought together into engagement with each other, but that they may thereafter not be separated any longer unless the elements are destructed or without taking special measures. Such special measures could for example consist in forcing the tongues outwardly away from

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each other by a suitable tool so that the extension 6 may leave the engagement with the tongues in order to release the elements from each other. However, this implies that an adhesive possibly used has not cured.

5

The tongues 5 and the extension 6 have outside and inside, respectively, the hook formations 7 and 8, respectively, first surfaces 11, 12, which diverge in a direction away from the first element 1 as seen in the assembled state of the elements.

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Furthermore, the tongues 5 and the extension 6 have inside and outside the hook formations 7, 8, respectively, second surfaces 13, 14, which also diverge in a direction away from the first element 1 as seen in the assembled state of the elements.

15

The first surfaces 11, 12 of a tongue 5 and one side of the extension 6 are substantially parallel to each other as seen in the assembled state of the elements. The second surfaces 13, 14 of a tongue and one side of the extension are also substantially parallel to each other as seen in the assembled state of the elements.

20

The tongues 5 are adapted to be affected inwardly to abutment against the intermediate extension 6 by a resilient force in the assembled state of the elements. The element 1 is suitably made so that the tongues 5 in their tension-free state are located closer to each other than when the extension 6 is inserted between the tongues so as to obtain this resilient influence or pre-tension of the tongues 5 against the extension.

25

30 An adhesive schematically indicated at 15 is applied between the tongues 5 and the extension 6 as seen in the assembled state of the elements. The adhesive is in the example only indicated to be applied on the surfaces of the element 2 designated by 12, i.e. so that the adhesive will act bindingly to those inner surfaces 11 on the tongues 5 which are located closest to the outer end portions of the tongues as seen in cross section as in the Figures, after the elements have been brought together. It is in this case intended that the adhesive 15 could

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be a tape which by an adhering flat side adheres to the surfaces 12 and is intended to have a coating layer on the side turned outwardly, said coating layer being removed when the elements are to be assembled with another element and which thereby expose a further adhering surface of the tape. The surface 11 of the tongues will enter into adhering contact with the tape when the elements are brought together, so that a joint is created. The tape may be of a more traditional type adhering permanently, but it may also consist of such an adhesive composition which starts to cure when the coating layer just described is removed, so that full strength of the joint does not exist before the curing is completed.

An adhesive of the traditional type may of course also be used, i.e. an adhesive which in liquid state is applied on surfaces of the tongues and/or the extension 6 arriving against each other.

The elements 1, 2 bear in the assembled state thereof against each other in the region between the tongues 5 through third surfaces 16, 17, which converge in the direction away from the first element 1, i.e. the one having the tongues 5. The third surfaces 16 of the first element form lateral surfaces of an extension 18, while the third surfaces 17 of the second element 2 form lateral surfaces of a recess 19 receiving the extension 18. Thus, the surfaces 16, 17 will in the assembled state of the elements co-operate in a wedge-like way closely with each other, so that a very high tightness is achieved. It is then of course essential that an extension 18 does not bottom in the recess 19 and that the portions of the element 2 located on both sides of the recess 19 does not hit portions of the element 1 located opposite to each other in such a way that the surfaces 16 and 17 do not enter into said wedging engagement with each other. It is namely exactly the inclination of the surfaces 16, 17 with respect to the plane of the elements 1, 2 which gives rise to the intimacy of the connection, said intimacy being improved if the intermediate layers 9 consist of a material being at least in some degree compressible.

It is preferred that the outer surfaces of the elements 1, 2 in the assembled state thereof become substantially completely smooth with

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the minor cavity 20 established at the extremity of the tongues 5 as the only exception. A condition therefor is of course that the extension 6 of the element 2 has a width or thickness being so much smaller that the tongues 5 are receivable on both sides of the extension without projecting outside the portions of the element 2 inside the extension 6. It also appears from this that the second element 2 at the transition between the smooth outer surface 21 thereof has a step or a terrace 22 resulting in a thickness reduction of the extension 6 inside the extension 6 and the adjacent surfaces 12, externally of which the outer end portions of the tongues 5 get located.

When two elements according to the invention are joined together an adhesive, for instance in the form of a tape 15, is possibly firstly applied on the inner side of the tongue 5 and/or the outer side of the extension 6, whereupon the elements are brought towards each other. Then the surfaces 11, 14 of the tongues 5 and the extension 6 diverging in the direction away from the element 1 engage with each other. The tongues will on sliding of said surfaces with respect to each other be affected in the direction away from each other until the hook formations 7 of the tongues finally snap over the hook formations 8 of the extension 6, so that the tongues may spring inwardly to the end position aimed at according to Fig 5. The inclined surfaces 16 and 17 of the elements will in the end phase of the approaching of the elements 1 and 2 be wedgingly pressed against each other, so that an intimate and tight bearing of the elements against each other is obtained also in the region between the tongues 5.

The provision of one or more projections 18 and one or more recesses 19 receiving these has also the advantage that a labyrinth effect is achieved in the bearing region between the elements. This labyrinth effect leads to an improvement security against leakage in the joint, completely irrespective of the inclined surfaces 16 and 17, and it is also assured that no light may pass through the surface layers 10 and straight through any straight but joint located therebetween between the intermediate layers 9.

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It is a matter of course that the invention is not only restricted to the embodiment described as an example. Many modifications may instead be carried out without departing from the inventional idea.

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Claims

1. A device in a joint between two elements (1, 2), which for joining thereof comprises female and male edge portions (3, 4), respectively,
5 a female edge portion (3) of a first of the elements having spaced tongues (5) adapted to receive an extension (6) forming the male edge portion of a second (2) of the elements therebetween, characterized in that the tongues (5) and the extension (6) have mutually co-operating engagement means (7, 8) adapted to automatically engage
10 with each other on bringing the elements together so as to counteract a separation of the elements thereafter.
2. A device according to claim 1, characterized in that the elements (1, 2) have the character of sheets.
- 15 3. A device according to claim 1 or 2, characterized in that each element comprises at least an intermediate layer (9) and two comparatively rigid surface layers (10).
- 20 4. A device according to claim 3, characterized in that the surface layers (10) are more rigid than the intermediate layer (9).
5. A device according to claim 3 or 4, characterized in that the intermediate layer (9) consists of an insulating material, especially
25 foamed plastic.
6. A device according to any of the claims 3-5, characterized in that the tongues (5) are formed by the rigid surface layers (10).
- 30 7. A device according to any of the claims 3-5, characterized in that the extension (6) is formed on one hand by said at least one intermediate layer (9) and on the other by parts of the surface layers (10) located on both sides thereof.
- 35 8. A device according to any of the preceding claims, characterized in that the engagement means (7, 8) have the character of inner and

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outer hook formations on the tongues (5) and the extension (6), respectively.

5 9. A device according to claim 8, characterized in that the tongues (5) and the extension (6) have first surfaces (11, 12) outside and inside the hook formations, which diverge in the direction away from the first element (1) as seen in the assembled state of the elements.

10 10. A device according to claim 8, characterized in that the tongues (5) and the extension (6) have second surfaces (13, 14) inside and outside the hook formations, respectively, which diverge in the direction away from the first element (1) as seen in the assembled state of the elements.

15 11. A device according to claim 9, characterized in that the first surfaces (11, 12) of a tongue and one side of the extension are substantially parallel to each other as seen in the assembled state of the elements.

20 12. A device according to claim 10, characterized in that the second surfaces (13, 14) of a tongue and one side of the extension are substantially parallel to each other as seen in the assembled state of the elements.

25 13. A device according to any of the preceding claims, characterized in that the tongues (5) are designed to be affected inwardly towards the extension (6) by a resilient force in the assembled state of the elements.

30 14. A device according to any of the preceding claims, characterized in that an adhesive is applied between the tongue (5) and the extension (6) as seen in the assembled state of the elements.

35 15. A device according to any of the preceding claims, characterized in that in the assembled state of the elements (1, 2) these bear against each other in the region between the tongues through third surfaces

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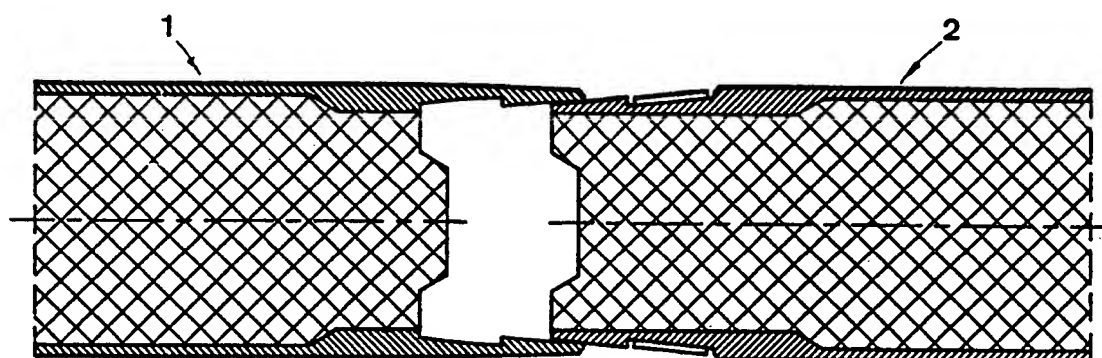
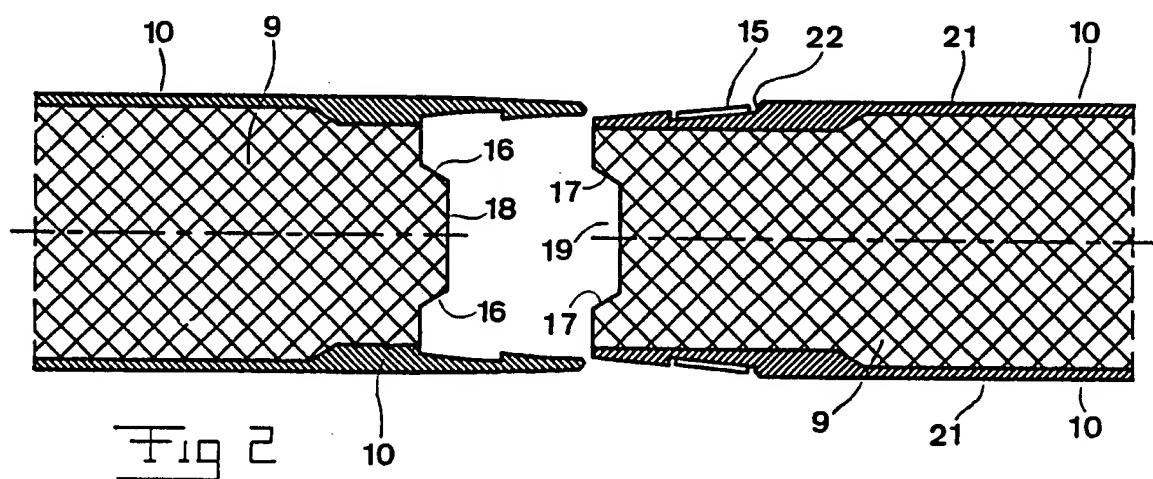
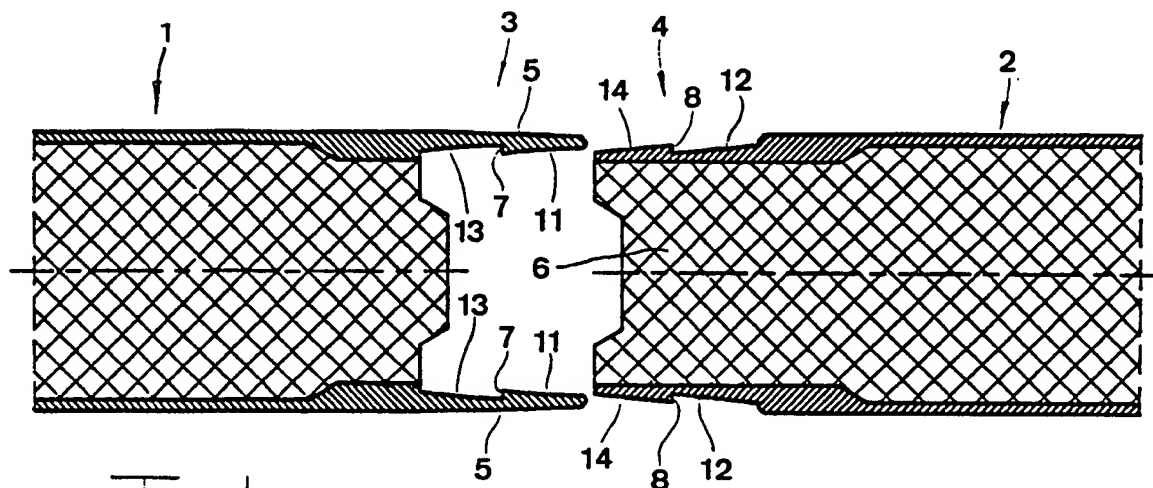
(16, 17), which converge in the direction away from the first element (1), i.e. the one having the tongues.

16. A device according to claim 15, characterized in that the third
5 surfaces (16) of the first element (1) form lateral surfaces of a projection (18), while the third surfaces (17) of the second element (2) form lateral surfaces of a recess (19) partially receiving the projection.

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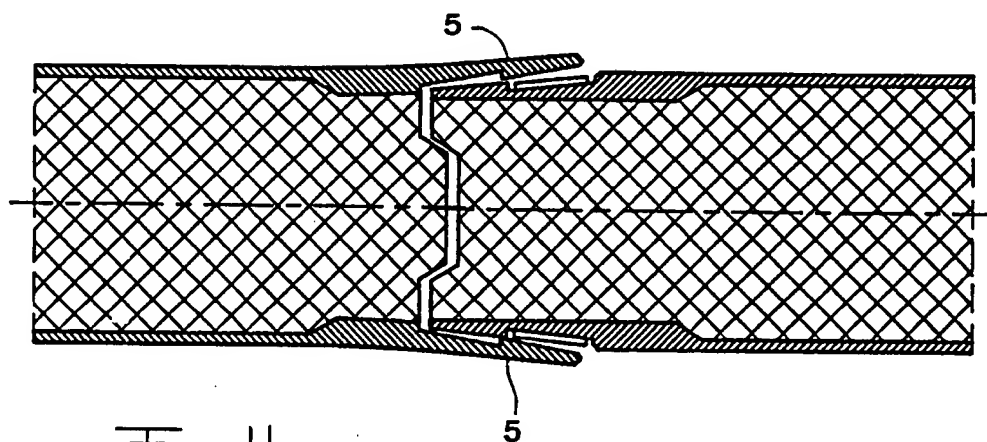


Fig 4

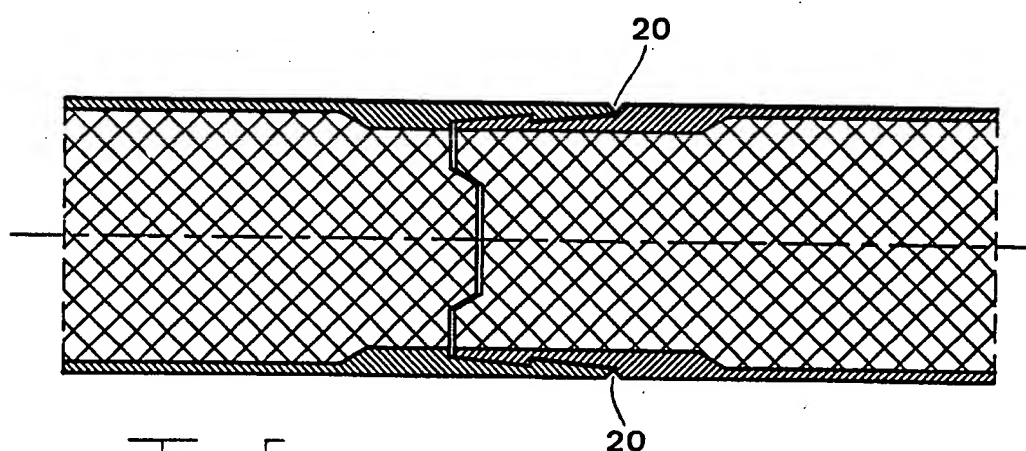


Fig 5

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INTERNATIONAL SEARCH REPORT

International application No.

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A. CLASSIFICATION OF SUBJECT MATTER

IPC5: E04C 2/26 // E04B 1/61

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC5: E04B, E04C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE, A, 2125537 (VEBMETALLEICHTBAUKOMBINAT), 13 April 1972 (13.04.72), claims 1-3, figure 1, details 5, 9 --	1
X	US, A, 5092095 (Y. ZADOK ET AL), 3 March 1992 (03.03.92), column 3, line 1 - line 36, figures 1, 5 --	2-13
A	US, A, 4186539 (W.M. HARMON ET AL), 5 February 1980 (05.02.80), figures 2-4, detail 26 --	14-16
A	US, A, 4769963 (S.C. MEYERSON), 13 Sept 1988 (13.09.88), column 2, line 28 - line 57, figure 3 --	14-16

☒ Further documents are listed in the continuation of Box C.
 ☒ See patent family annex.

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Date of the actual completion of the international search

17 November 1993

Date of mailing of the international search report

25 -11- 1993

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INTERNATIONAL SEARCH REPORT

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>US, A, 5086599 (S.C. MEYERSON), 11 February 1992 (11.02.92), column 5, line 37 - line 43, figure 10</p> <p style="text-align: center;">-- -----</p>	14-16

INTERNATIONAL SEARCH REPORT
Information on patent family members

01/10/93

International application No.
PCT/SE 93/00695

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DE-A-	2125537	13/04/72	FR-A- 2109679	26/05/72
US-A-	5092095	03/03/92	NONE	
US-A-	4186539	05/02/80	NONE	
US-A-	4769963	13/09/88	NONE	
US-A-	5086599	11/02/92	US-A- 5216861	08/06/93
			AU-B- 626781	06/08/92
			AU-A- 7529991	07/11/91
			GB-A- 2243381	30/10/91